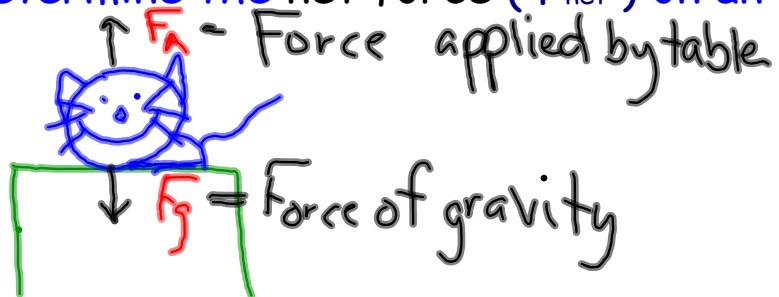


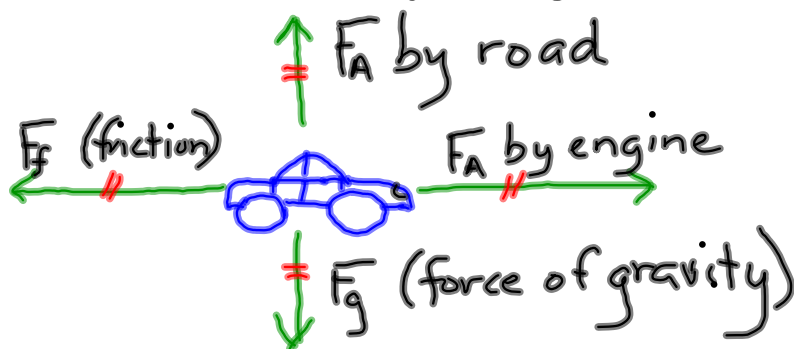
Free Body Diagrams (FBD's)

The FBD is a powerful tool for analyzing force problems. It simplifies the problem by isolating the object to be studied from its environment. On the FBD we draw only the forces acting on the object. These forces are always drawn pointing away from the object we are studying. FBD's help you to determine the net force (F_{net}) on an object.

$F_{net} = 0$
not moving!



Sample Free Body Diagrams



If the forces are all balanced then

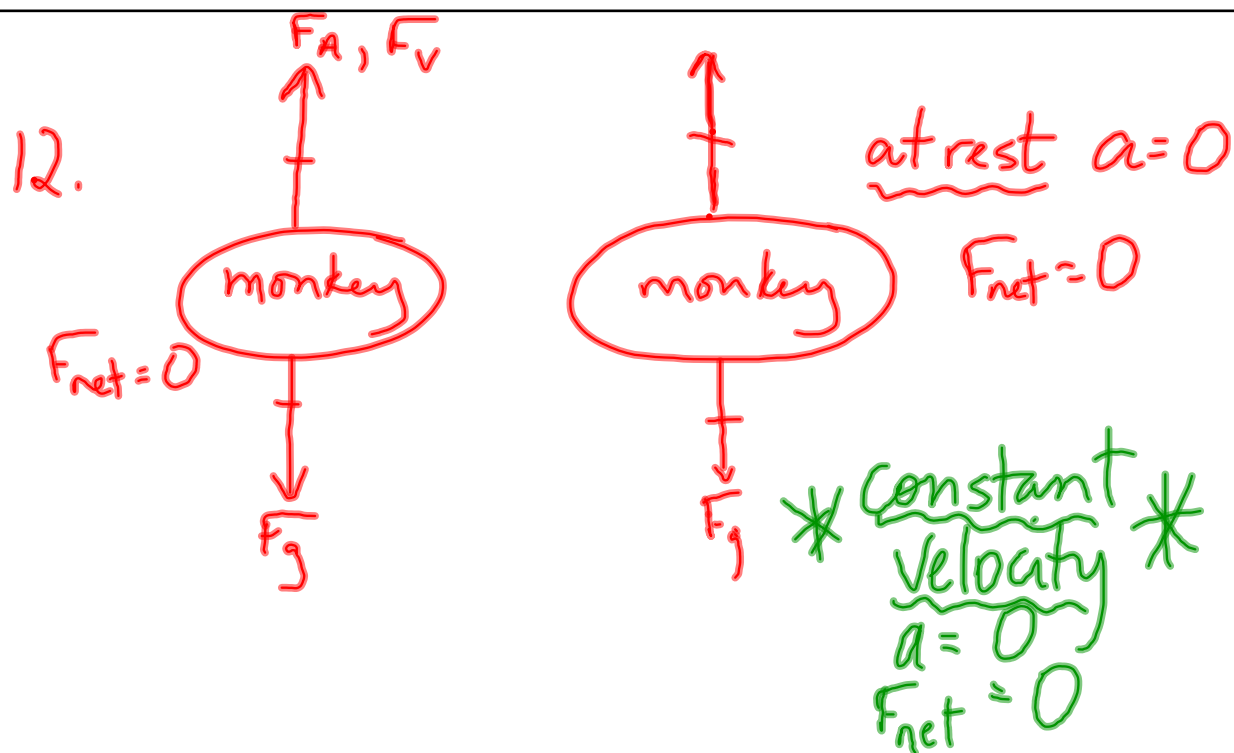
$$F_{\text{net}} = 0$$

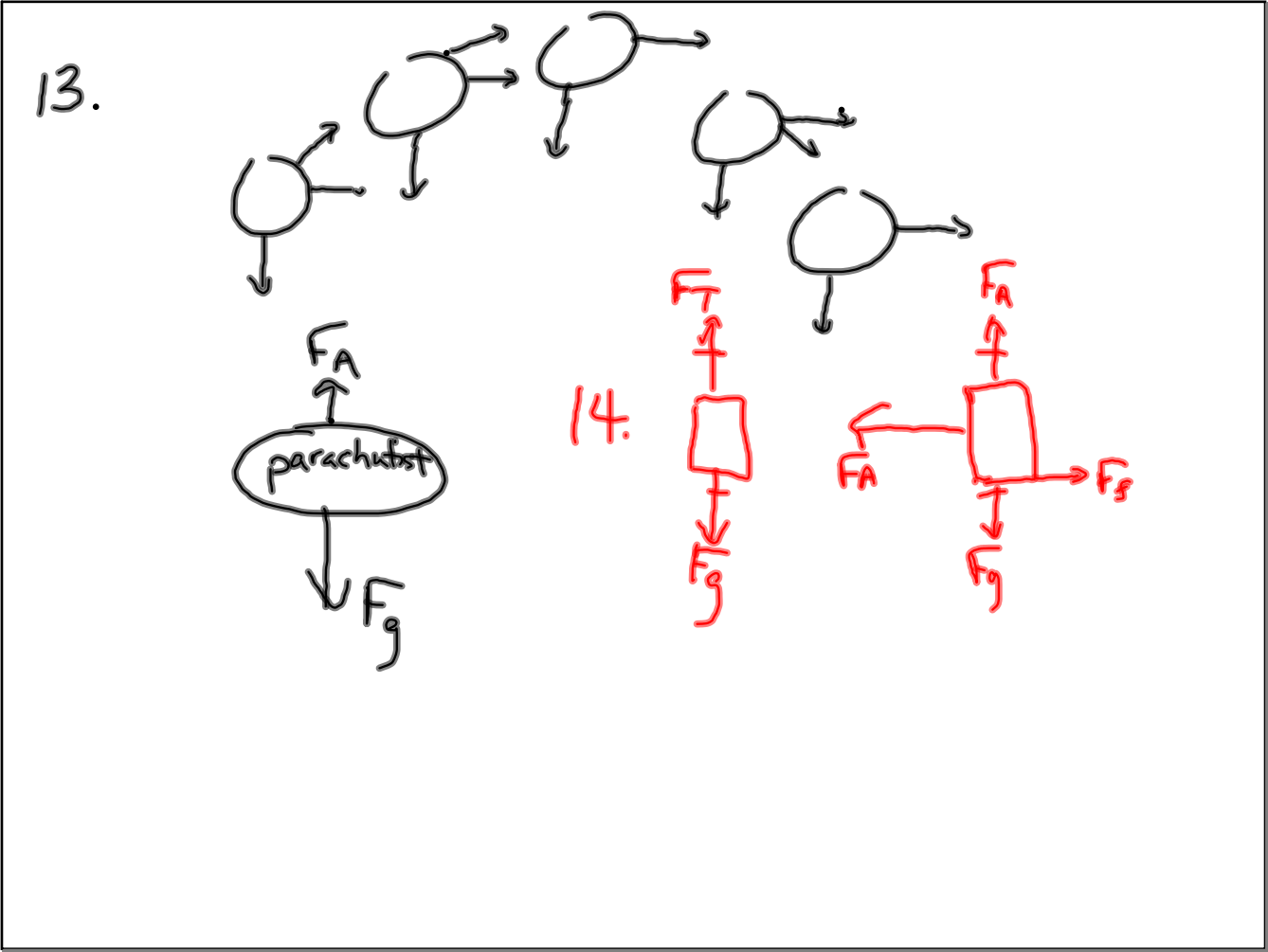
and the car is moving at a constant velocity.

If F_A by engine is greater than F_f the car is accelerating.

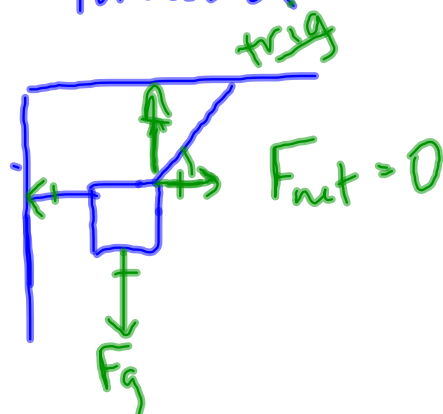
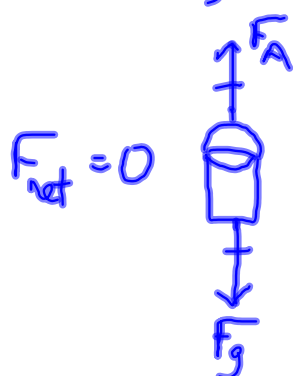
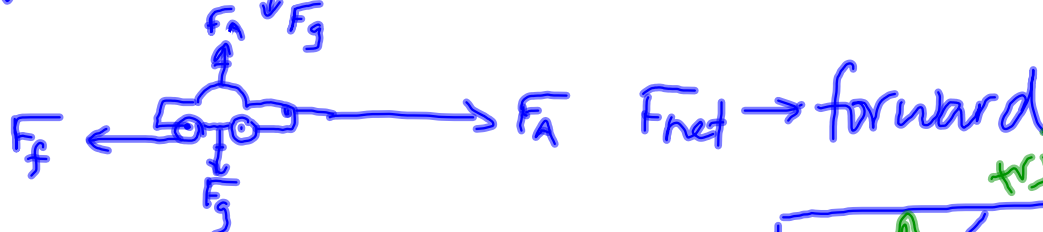
P. 147, 148

10 - 15





15.



Weight - A force equal to the magnitude of the gravitational force acting on an object

$$F_g = mg$$

F_g is weight in N

m is mass in kg

g is acceleration in m/s^2 (-9.81 m/s^2)

Mass is the amount of matter an object possesses.
It is a measure of an objects inertia (in kg).

The weight of an object can vary depending on the force of gravity acting upon it at any time. Under ordinary conditions, the mass of a body never changes. This means that, although an object may "weigh" less on the moon, changing its position (ex. swinging it sideways from one stationary position to another) would be just as difficult as on earth (due to equal inertia).

Normal Force

The force that acts perpendicular to a surface. This is usually equal in magnitude but opposite in direction to F_g .

Therefore: $F_N = - F_g = mg$ (We usually don't worry about the -)

In Class Activity

Create a data table to record the following for 5 objects: mass in grams, mass in kg, weight in Newtons from the spring scale reading, weight in Newtons by calculation using $F_g = mg$, Normal force in N.

Working in small groups, complete your table for the 5 items provided. Beneath the data table, describe how weight is different than mass.

Homework

P. 137 #1 - 4 (See p. 132 & 133 for values)

P. 147 # 1, 5, 8

